

AMENDMENTS

In the specification:

The following listing of amended paragraphs will replace all prior versions, and listings, of corresponding paragraphs in the application. Currently amended paragraphs are shown with additions underlined and deletions in [brackets]. No new matter is added by this amendment.

[0003] RF tags may consist of single integrated circuits, circuits and antennae, or may incorporate more complex capabilities such as computation, data storage, and sensing means. Some categories of RFID tags include the following: passive tags that acquire power via the electromagnetic field emitted by the interrogator, semi-passive tags that respond similarly, but also use on-board stored power for other functions, active tags that use their own stored power to respond to an interrogator["']s signal, inductively coupled tags that operate at low frequencies and short distances via a coil antenna, single or dipole antenna-equipped tags that operate at higher frequencies and longer distances, read-write tags that can alter data stored upon them, full-duplex or half duplex tags, collision arbitration tags that may be read in groups, or non-collision tags that must be read individually.

[0006] U.S. Pat. No. 6,127,928 discloses an apparatus and method for a radio frequency document control system that enables the location of documents, such as office files, to be automatically and rapidly identified. The apparatus differs from this invention in a number of regards: the intermediate transceiver is not attached to a mobile container or described as operating while in motion; it requires a personal computer or other computation means to process the identity of documents; and its order of communication between transceivers does not allow for switched, efficient scanning of a container["']s content.

[0010] One embodiment of the apparatus comprises a container, an on-board interrogator with a mobile stored power means, a mechanical electrical switch affixed to the container["']s opening, an externally accessible radio frequency (RF) tag, multiple tags affixed to objects sufficiently small to lie within the container, and an external interrogator or interrogators which communicate with the apparatus["']s externally accessible RF tag.

[0011] When the container is closed, the mechanical switch, which is affixed to its opening, signals to the on-board interrogator that it should function for a preset period of time. The interrogator then queries RF tags within its interior and reads their IDs into stored memory within the externally accessible RF tag attached to the container. When the external interrogator polls the externally accessible RF tag or detects the externally accessible RF tag["']s beacon, it acquires the inventory of the internal tags that was established at the time the container was closed. Because the externally accessible RF tag may be an active tag with significant stored power, a potentially more effective frequency, and with less shielding by the container walls, it may have a much greater range and capacity to surmount obstacles than the RF tags within the container. The structure of the container, externally accessible RF tag, and antenna may be configured such that a desired successful read rate can be achieved given known configurations of containers. The apparatus allows for automatic translation between RFID systems: while the container["']s interior may be populated with RF tags that cannot be read by an external interrogator, as long as the externally accessible RF tag is compatible, the entire group represented by the container and its contents may be inventoried by the external interrogator.

[0022] FIG. 3 is a flowchart illustrating an operating cycle typical of inventorying the container. In 301, the cycle is initiated, generally when the apparatus is powered on or the stored power means is recharged or refueled. In 302, the apparatus is in a power conserving state, waiting for the container door switch to toggle it into inventory acquiring mode. In other embodiments a motion sensor or timer circuit might trigger the acquisition of inventory. In 303, once the apparatus has entered inventory acquiring mode, it polls the RF tags attached to internal objects, reads the RF tags[""] response signals, and stores the identification values into the on-board memory means, such as EEPROM memory. In 304, the apparatus checks to see if additional tags are available within the container for reading. If so, control returns to 303. If not, then control proceeds to 305, where a test is made for whether the interrogation period time interval has elapsed. If not, then control is returned to 303. If so, then the apparatus ends internal interrogator polling, returning to power conserving mode and ending the inventorying cycle.

[0023] FIG. 4 is a flowchart illustrating an operating cycle typical of remotely acquiring the inventory of the container. The cycle begins in 401, generally after the inventorying cycle of FIG. 3. In 402, either the externally accessible RF tag sends a beacon at preset intervals or waits for a signal from an external interrogator, depending on the RF tag type or mode of operation. In 403, once a polling signal has been detected, the apparatus performs a test to determine whether the container door is open. In 404, control returns to 403 if the door is open to prevent transmission of erroneous inventory information. If the container door is closed, control proceeds to 405, whereupon the apparatus sends the inventory of the container[""]'s contents to the external interrogator.